Remarks

Status of the Claims

Claims 1 – 20 were original in the application. Claim 20 has been withdrawn and cancelled without prejudice. Claims 1 – 4, 18, and 19 have been previously cancelled. Therefore, claims 5 – 17 are submitted as being set forth in allowable form.

Claim Rejections - 35 *USC* § *103*

Claim 5 was rejected as being obvious over **Hollis** in view of **Thomas *et al.*** US. Patent 6,444,474. The Examiner contended that the recitation that the integrated LED and integrated optical detector are tuned to an optical absorption line of an analyte is considered a functional limitation.

The Examiner contends in regard to claim 5, that **Hollis** teaches an apparatus comprising: an integrated microfluidic peristaltic pump (PI); a plurality of analysis chambers (wells 42 formed in each test site 12' contained in array 10) in communication with the pump; and a plurality of analysis devices (i.e., a micromechanical resonator, surface acoustic or electromagnetic wave detector, or a monolithic ally integrated charge-coupled device (CCD), etc.), which test a fluid contained within the analysis chambers for an analyte (see col. 4, line 15 - col. 15, line 51; figures 1 - 6, 18 & 19).

The Examiner admitted that **Hollis** is silent to specifically teaching the incorporation of an integrated LED. The Examiner contended that **Hollis** does

teach the incorporation of an integrated optical detector, such as a monolithic ally integrated charge-coupled device (CCD) (see col. 8, lines 59 - 67) and the incorporation of a laser light source (416') for laser scanning of the test sites (see col. 14, lines 33 - 50).

Thomas was cited as teaching the use of LED and laser diode light sources with a microfluidic analysis system (col. 16, lines 36 - 45). The Examiner concluded that it would be obvious to incorporate an integrated LED with a microfluidic analysis system for the same intended purpose of facilitating effective sample processing and analysis (MPEP § 2144.07). Furthermore, the Examiner contended that these light emission and detection systems are considered functionally equivalent (MPEP § 2144.06) in that an express suggestion to substitute one equivalent component or process for another is not necessary to render such a substitution obvious. *In re Fout,* 675 F.2d 297,213 USPQ 532 (CCPA 1982).

Care should be taken to review what **Thomas** actually teaches in regard to integrated LEDs in the context of claim 5. What **Thomas** states at the cited section, col. 16, lines 36 – 45, is:

> "In alternate specific embodiments, microfluidic TOC devices of this invention can employ WO_3 -based photocatalysts. WO_3 semiconductors have a lower bandgap energy compared to TiO_2 materials allowing the use of lower energy light ($\lambda \leq$ about 480 nm) for illumination of the photocatalyst. The use of WO_3 photocatalysts facilitates lower cost TOC devices that may employ non-UV or near-UV sources, **for example, LED (light emitting diode)** and laser diode light **sources**. Photoelectrocatalysis can also be adapted for use with WO_3 -based photocatalysts.

LED are nowhere else even mentioned in **Thomas**. In the cited section Thomas

is entirely silent on how or where the LED might be in the TOC device.

Thomas describes the use of a UV source to irradiate the microfluidic sample cell to activate a photocatalyst to start a chemical reaction that will create CO_2. (col. 3, lines 39 – 44). It is not an optical analyzer, but a chemical analyzer in which an exterior light is being used for an entirely different purpose than the integrated LED in claim 5.

It is very clear throughout the specification that **Thomas** is also teaching an exterior UV source that shines on the microfluidic sample cell. The UV source is clearly not part of the microfluidic sample cell in any sense. For example, at col. 3, line 63 – col. 4, line 7, **Thomas** teaches:

> "In the devices of this invention, **a UV source is positioned to irradiate a sample volume in the sample cell**. If present, the photocatalyst is positioned in contact with the sample volume and positioned to be irradiated by the UV source. **Typically, in the device, a UV source is held in a fixed position with respect to the sample cell, for example, in a sample holder.** The UV source may be in contact with the sample cell. A reflective surface or mirror can also be provided in the device, e.g., at the bottom of the sample cell, sample channel or sample cavity, to provide for multiple passes of light through the sample volume to increase the optical path length through the sample." (emphasis added)

MPEP § 2144.07 addresses art which is recognized as suitable for a particular purpose. The examples given dealt with the suitability of compositions of matter with the exception of one mechanical example. *Ryco, Inc. v. Ag-Bag Corp.*, 857 F.2d 1418, 8 USPQ2d 1323 (Fed. Cir. 1988) claimed an agricultural bagging machine, which differed from a prior art machine only in that the brake means were hydraulically operated rather than mechanically operated. The substitution of mechanical brakes for hydraulic brakes was held to be obvious over the prior art machine in view of references which disclosed hydraulic brakes

for performing the same function, albeit in a different environment.

Here the Examiner seeks to extrapolate the use of an external UV light source shining on a microfluidic chip that is made of material transparent to UV in which a chemical photocatalyst is triggered to cause a chemical reaction, as suggesting a tuned LED light source integrated into an optical microfluidic analyzer having a peristaltic pump. No chemical reactions are involved with respect to the operation of the LED. The difference is not a mere substitution, but are modification of the prior art in several technical particulars in hindsight to result in a novel microfluidic analytic optical device. The only similarity is that a light source is mentioned in the same document as a microfluidic chip. That does not motivate or lead to all possible combinations microfluidic chip with LED for any all conceivable unrelated purposes.

The fact that the purpose the LED is not the same as the UV light source is alone enough to take the issue out of the scope of the policy addressed in MPEP § 2144.07.

On the same ground the reliance on MPEP § 2144.06 to hold that **Thomas** is art which is recognized equivalence for the same purpose as claim 5 is error. In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958). In this case Thomas' use of the UV light is not even the functional equivalent to the LED of claim 5, one activates a catalyst in a chemical reaction,

the other is part of an optical analysis of an analyte. The analyte does not undergo any chemical reaction as a function of being irradiated by the LED. The contrary is true. Such a catalytic or chemical change would destroy the functional purpose of the optical analyzer.

Regarding the recitation in claim 5 that the integrated LED and optical detector further comprise means tuned to an optical wavelength absorption line of an analyte, the Examiner deemed it obvious without citation to any art to provide tuning means, such as for an appropriate light wavelength emission to effectively detect the target analyte.

Pursuant to MPEP 2144.03 the applicant asserts that it is never appropriate to rely solely on "common knowledge" in the art without evidentiary support in the record, as the principal evidence upon which a rejection was based. *Zurko*, 258 F.3d at 1385, 59 USPQ2d at 1697. The Applicant challenges the factual assertions made with respect to claim 5 as not properly officially noticed or not properly based upon common knowledge, and requests support with adequate evidence. The use of an exterior UV light source as a photoactivator of a catalyst in a chemical reactor does not motivate or lead to a tuned integrated optical analyzer where chemical reactions or photoactivation of a chemical change is not part of the optical analysis being performed. The mere aggregation of an exterior light source with a microfluidic device does not allow an obviousness determination to be sustained as a matter of common knowledge.

Claims 6 - 17 were rejected as being obvious over **Hollis** in view of **Bridger et al.** US. Pat. 6,579,068. Regarding claims 6, 7, 11, 12 and 14 - 17, the Examiner cited **Hollis** as teaching an apparatus comprising: an detector, or a monolithically integrated charge-coupled device (CCD), etc.), which test a fluid contained within the analysis chambers for an analyte; (col. 4, line 15 - col. 15, line 51; figures 1 - 6, 18 & 19).

The Examiner admitted that **Hollis** does not specifically teach the incorporation of a micropump comprising the characteristics as recited. Hence the Applicants understand that the distinctions raised in the prior amendment successfully distinguish the claims from **Hollis**.

The Examiner cited **Bridger** as teaching a micropump comprising: a bowed electrodeformable membrane (12); pillars (14) composed of n-type GaN; a substrate (16) disposed below the membrane and coupled thereto; a micro channel (20) defined between the membrane and the substrate, wherein the microchannel comprises a longitudinal axis; and an electrode structure (e.g., opposing sets of metallic contact pads 18a & 18b) disposed on at least one side of the membrane along a side of the micro channel (col. 4, line 62 - col. 6, line 53; figures 1, 4d & 4e). The Examiner contended that **Bridger** teaches that the disclosed micropump is suitable for micro-chemical or microfluidic analysis devices (col. 7, lines 44 - 50). The Examiner contended that it would have obvious to recognize the suitability of incorporating the micropumps disclosed by **Bridger** with a microfluidic analysis system for the same intended purpose of facilitating effective sample processing and analysis (MPEP § 2144.07).

Furthermore, the Examiner contended that both **Hollis** and **Bridger** disclose the use of micropumps with analytical microfluidic devices, which are considered functionally equivalent (MPEP § 2144.06), again contending that an express suggestion to substitute one equivalent component or process for another is not necessary to render such a substitution obvious. *In re Foul,* 675 F.2d 297,213 USPQ 532 (CCPA 1982).

Regarding claims 8 and 13, the Examiner contended that **Bridger** teaches the incorporation of a drive circuit or conventional timing circuit for voltage application in order to operate the micropump (col. 6, line 54 - col. 7, line 33).

Regarding claims 9, 10 and 14, the Examiner contended that **Bridger** teaches that the electro-deformable membrane consists of p-type GaN (Abstract & col. 4, line 62 - col. 5, line 44).

The present application was filed on Aug. 7, 2001, the same filing date of **Bridger,** and claims priority to U.S. Provisional Application 60/223,672, which in turn was filed on Aug. 8, 2000, one day before U.S. Provisional Application 60/224,106 to which **Bridger** claims priority. Hence, as of the effective filing date of the present application **Bridger** cannot be considered prior art under sections 102/103.

Advancement of the claims as amended to allowance is respectfully requested.

Respectfully submitted,

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